

REMARKS

Claims 9-22 were pending, with claims 11, 14-18, and 22 being cancelled herein. New claims 23-31 are added herein. Claims 9, 12, and 28 are in independent form.

Support for new claims 23-31 may be found, for example, at the locations set forth in the following table:

Claim 23	Previously presented claim 11; Page 5, line 35 – page 6, line 6; Page 7, line 32 – page 8, line 9; Page 8, lines 29-31; and Page 15, lines 15-26.
Claim 24	Page 2, lines 35-37; and Page 11, lines 11-33.
Claim 25	Page 3, line 35 – page 4, line 23
Claim 26	Page 10, lines 16-34
Claim 27	Page 4, lines 25-29
Claim 28	Previously presented claims 9 and 11; and Page 4, line 34 – page 5, line 2
Claim 29	Previously presented claim 10
Claim 30	Previously presented claim 13
Claim 31	Page 4, lines 25-29

No new matter has been added via the amendments made herein.

Presently, claims 9, 11-13, and 15 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,739,620 to Pierce (“Pierce”). Claims 10, 17-19, and 21 stand rejected under 35 U.S.C. §103(a) as being obvious over Pierce in view of U.S. Patent No. 4,299,199 to Girone (“Girone”). Claim 14 stands rejected under 35 U.S.C. §103(a) as being obvious over Pierce in view of U.S. Patent No. 6,233,938 to Nicodemus (“Nicodemus”). Claims 16 and 22 stand rejected under 35 U.S.C. §103(a) as being obvious over Pierce in view of U.S. Patent No. 4,366,674 to Eakman (“Eakman”). Claims 14 and 20 stand rejected under 35 U.S.C. §112, first paragraph, for failure to satisfy the written description requirement. The Examiner has objected to the drawings for failure to depict a deforming and dehumidifying reservoir.

I. §112 Rejections and Objections to the Drawings

The Examiner rejected claims 14 and 20 for failure to find written description support for the recited limitation of a “defoaming and dehumidifying reservoir.” Similarly,

the Examiner objected to the drawings for failure to depict a defoaming and dehumidifying reservoir. As claim 14 is cancelled herein, this rejection is moot. Claim 20 has been amended to recite a "return chamber," which is shown in Figs. 1 and 2 as element 19. Support for this amendment may be found, for example, on page 8, line 33 - page 9, line 15, in Figs. 1 and 2, and in originally filed claim 6. Accordingly, Applicant respectfully requests that the rejection to claim 20 and the objections to the drawings be withdrawn.

II. Prior Art Rejections to Claim 9

Claim 9, as amended, includes the limitations of previously presented claims 9, 11, and 16, and further recites additional features described in the specification, as set forth below. Previously presented claims 9 and 11 were rejected by the Examiner as being anticipated by Pierce. Claim 16 was rejected by the Examiner as being obvious over Pierce and Eakman. A combination of the features of these three claims therefore is at least novel over the cited prior art, as implicitly already admitted by the Examiner, let alone with the additional features presently being added.

Pierce discloses a power system for use in converting solar energy into useful and stored energy available as output power capable of operating diverse types of power-driven units, including electric generators (see abstract of Pierce). The Pierce system comprises a heat input module (solar panel / solar boiler 11) and an accumulator module (collector tank 16). A refrigerant is heated in the solar panel and converted to a pressurized gas. The solar panel and collector tank are connected (by tube 15) for exchanging fluids in the form of pressurized gas. The pressurized gas then flows from the collector tank through a conduit (17) to an energy conversion system (e.g., col. 2, lines 28-33), and from there the expanded gas is returned through a pipe (18) and a condensor (19) to the solar boiler (11). The energy conversion system comprises a large motor in the form of a heat engine. A small motor in the form of a compressor is connected reciprocally to the movement of the piston in the heat engine cylinder. In the large motor, the compressed gas is used to operate a power-driven device. Thus, a portion of the energy produced by the heat engine may be used to operate a power-driven device, and the remainder of such energy is used to compress a gas in a compressor, in order to store latent energy for use as needed. *See Pierce*, at col. 4, lines 26-36. The remainder of the energy, after being condensed back to liquid, instead of being returned to the boiler, is thus used for hydraulic pressurization in a small motor (piston 72,

cylinder 71) for compression of air or other gas drawn in and then expelled again into further storage tanks (154, 155). *See* Fig. 1 and col. 2, lines 36-47; col. 4, lines 32-36.

Pierce fails to teach or suggest the feature of amended claim 9 that “the energy conversion device is a hydraulic motor which can be connected with a gear unit of the apparatus.” For the principal output of the solar energy power system (i.e., the heat-engine with the large motor having a piston 52 in cylinder 51, *see* col. 4, lines 26-36), Pierce does not disclose a hydraulic system, but a pneumatic one. Fluids heated by solar heat undergo a state change from liquid to gas, the gas is compressed, and the compressed gas is made available on demand to perform work. Pierce specifically teaches the use of pneumatic energy conversion systems, in which compressed gas is used as an actuator. In the embodiments shown in Fig. 1, 3, and 5 of Pierce, pistons in cylinders are actuated. *See* Pierce, at col. 2, lines 28-40; col. 6, lines 50-56. In the embodiment of Fig. 2, the energy conversion system is a turbine (300), which is also actuated by compressed gas. *See* col. 5, lines 24-46. For the remainder of energy produced by the heat engine, Pierce discloses, separate from the energy conversion system, a compressor driven by the principle of hydraulic pressurization. However, Pierce does not disclose or suggest any energy conversion system in the form of a hydraulic motor. Furthermore, in Pierce, there is no suggestion that the energy conversion device (i.e. the heat engine) can be connected with a gear unit of the apparatus.

Pierce also fails to teach or suggest the feature of amended claim 9 that “the device transmitting a heat input is an internal combustion engine, the internal combustion engine being connected with the gear unit of the apparatus.” In Pierce, the only device disclosed as a device transmitting a heat input is a solar panel / solar boiler (11). The whole invention is directed toward the conversion of solar energy (*see, e.g.*, abstract; col.1, lines 13-29; col. 2, line 21; etc.), and not toward heat energy in general. Pierce does not disclose or suggest any combustion engine for use as a device which transmits a heat input.

Pierce further fails to teach or suggest the feature of amended claim 9 that “pressure bottles are provided for intermittent storage of pressurized hydraulic liquid, the combustion heat from the engine being essentially absorbed in the pressurized liquid, and the pressure bottles are also provided for subsequent supply of the pressurized hydraulic liquid to the hydraulic motor for driving said hydraulic motor.” In the present invention according to amended claim 9, the pressurized hydraulic liquid is temporarily stored in a pressurized state

in pressure bottles, which then supply the pressurized liquid to the hydraulic motor. *See* page 13, line 34 – page 15, line 13. In *Pierce*, pressurized gas, not pressurized liquid, is stored. *See Pierce*, at col. 2, lines 28-30; col. 4, lines 26-29. After the compressed gas passes through the condenser (19), it is guided, in liquid form, back to the solar boiler (11). *See Pierce*, at col. 2, lines 33-35. Also, the accumulator in *Pierce* is a collector tank (16), and not one or more pressure bottles, as is recited in amended claim 9. Furthermore, in *Pierce* there is no disclosure of storage of combustion heat from an engine.

There are no teachings in *Eakman* which are sufficient to overcome the deficiencies of *Pierce* discussed above, which would render claim 9 obvious. A person skilled in the art seeking to find a system for the storage and conversion of heat energy, starting from *Pierce*, would have no reason to turn to *Eakman* at all. This is because *Eakman* is directed to an internal combustion engine with a Rankine bottoming cycle for conversion of heat into work. Because *Pierce* is only concerned with the use of solar energy, there would be no reason to look for a way of generating energy using the heat loss from an internal combustion engine and the retarding energy of a motor vehicle, and then storing it for later use by other applications.

Furthermore, even if a person skilled in the art were looking for a way of using the excess heat of an internal combustion engine, such a person would not turn to *Eakman*. *Eakman* is not concerned with energy storage at all, but only the recycling of heat lost by exhaust gases of a combustion engine. *Eakman* also concerns a pneumatic system rather than a hydraulic one, as is set forth in claim 9. In *Eakman*, the heat input coming from an internal combustion engine is transmitted via a line (62) to an expander (24) in the form of a turbine (*see Eakman*, at col. 3, lines 18-21), which takes up the exhaust gases coming from the internal combustion engine. The expander-turbine is said to have a rotary output shaft which is employed to drive a compressor (28). *See Eakman*, at col. 3, lines 19-21. The compressor compresses air, which is directed via an aftercooler back to the engine. The expander therefore is the energy conversion device, since it has a mechanical output for performing work (*see col. 2, lines 19-20; col. 5, lines 29-30*), and the line (62) takes over the job of the transmitting device. In *Eakman*, the heat-input transmitting device therefore is not an internal combustion engine, and the energy conversion device not a hydraulic motor, as is set forth in currently amended claim 9.

Therefore, even if a person skilled in the art would seek to solve such a problem *and* would turn to Eakman, such a person would not arrive at the present invention according to amended claim 9. Eakman does not disclose the claimed features of absorbing the output heat of an internal combustion engine in a hydraulic liquid, converting the energy to increased pressure, and then storing it for generating mechanical energy by a hydraulic motor in a later application. In Eakman, the heat of exhaust gases of the combustion engine is expanded and recycled for re-use by the same combustion engine, but not transiently stored in a pressurized state, let alone in pressure bottles, as set forth in claim 9. A person skilled in the art, who would turn to Eakman, would at the most try to introduce an expander with a mechanical output to the system. However, even this would not lead to the present invention, in which expansion is avoided by the system by converting the heat to an increasing pressure. Furthermore, the person skilled in the art would be guided to use a pneumatic system rather than a hydraulic one when taking Eakman into account.

For at least the above reasons, the subject matter of claim 9 is neither taught nor suggested by Pierce or Eakman, taken either alone or in combination. Accordingly, claim 9 is patentable over Pierce and Eakman.

III. Prior Art Rejections to Claim 12

Claim 12 includes the limitations of previously presented claims 9 and 12. Previously presented claims 9 and 12 had been rejected by the Examiner as being anticipated by Pierce. However, Pierce fails to disclose at least the feature of amended claim 12 that “the energy conversion device is a hydraulic lifting apparatus or a torque-storing apparatus.” As mentioned above in the discussion of claim 9, Pierce does not specify the energy conversion system other than in the embodiments depicted in the Figures. In Fig. 1 of Pierce, the energy conversion system comprises a heat-engine with a cylinder (53) and piston (52). *See* Pierce, at col. 2, lines 28-40. The embodiments of Fig. 5 and 7 also comprise cylinders and pistons. *See* col. 6, lines 50-56; col. 8, lines 5-12. In the embodiment of Fig. 2 in Pierce, the energy conversion system is a turbine (300). *See* col. 5, lines 24-46. The main energy conversion devices are driven by compressed gas, i.e., pneumatically. Pierce neither discloses nor suggests any energy conversion system in the form of a hydraulic lifting apparatus or a torque-storing apparatus, but only discloses a pneumatic system. Indeed, the compressor (71, 72) disclosed in Pierce for use of the remainder of energy does not belong to the energy

conversion system, and is therefore not equivalent to the claimed hydraulic lifting apparatus or torque storing apparatus. *See* col. 2, lines 31-35 (stating that the pressurized gas flows into the energy conversion system and then flows through pipe (18) and condenser (19) for return to the solar boiler (11)).

Further, there are no teachings in Eakman which overcome the deficient disclosure of Pierce to render claim 12 obvious. Aside from the fact that Pierce contains no suggestion to solve such a problem at all, a person skilled in the art, seeking to find an improved system for the storage and conversion of heat energy *other* than solar energy (as discussed above for claim 9), starting from Pierce, would have no reason to turn to Eakman at all. Eakman is merely concerned with the recycling of exhaust gases of an internal combustion engine.

Further still, even if one would turn to Eakman, a person skilled in the art would not arrive at the present invention, as Eakman also fails to disclose or suggest an energy conversion device in the form of a hydraulic lifting apparatus or a torque-storing apparatus. In Eakman, the heat input coming from an internal combustion engine is transmitted to an expander (24) in the form of a turbine (col. 3, lines 19-21), the expander taking up the exhaust gases (12) coming from the internal combustion engine (10). The expander-turbine is said to have a rotary output shaft which is employed to drive a compressor (28). Eakman, at col. 3, lines 19-21. The compressor compresses air, which is directed back to the engine. The expander therefore operates as the energy conversion device, since it has a mechanical output for performing work. *See* col. 2, lines 19-20; col. 5, lines 29-30. This expander in Eakman is not a hydraulic lifting apparatus or a torque-storing apparatus, as is recited in amended claim 12.

For at least the above reasons, the subject matter of claim 12 is neither taught nor suggested by Pierce or Eakman, taken either alone or in combination. Accordingly, claim 12 is patentable over Pierce and Eakman.

IV. Patentability of New Claim 28

Claim 28 includes the limitations of previously presented claims 9 and 11, and includes further limitations described in the specification on page 4, line 25 – page 5, line 2. Previously presented claims 9 and 11 had been rejected by the Examiner as being anticipated by Pierce. Pierce however, fails to disclose at least the feature of new claim 28 that “the

device transmitting a heat input is a hydraulic motor working as a hydraulic pump and driven by a gear unit of the apparatus.” As already mentioned above in the discussion of claim 9, in *Pierce*, the only device disclosed as a device transmitting a heat input is a solar panel (11), as the whole invention is directed toward the conversion of solar energy. *See Pierce*, at abstract; col. 1, lines 13 and 25; col. 2, line 21; etc. *Pierce* is not directed toward heat energy in general. *Pierce* does not disclose or suggest any hydraulic motor for use as a device transmitting a heat input, working as a hydraulic pump and driven by a gear unit of the apparatus. The hydraulically driven compressor disclosed by *Pierce* in connection with Fig. 1 belongs to the energy conversion system, not the heat input transmitting device. *See col. 2, lines 28-35.*

Further, nothing in *Eakman* provides sufficient teachings to overcome the deficiencies in *Pierce* to render the subject matter of claim 28 obvious. Aside from the fact that *Pierce* contains no suggestion to solve such a problem at all, a person skilled in the art, seeking to find an improved system for the storage and conversion of heat energy *other* than solar energy (as discussed above for claim 9), starting from *Pierce*, would have no reason to turn to *Eakman* at all. *Eakman* is merely concerned with the recycling of exhaust gases of an internal combustion engine.

Furthermore, even if one would turn to *Eakman*, a person skilled in the art would not arrive at the present invention as set forth in new claim 28. *Eakman* fails to disclose or suggest a heat-input transmitting device in the form of a hydraulic motor working as a hydraulic pump. In *Eakman*, the heat-input transmitting device is an internal combustion engine, from where the exhaust (12) is guided to a boiler (18) for vaporization purposes. *See Eakman*, at col. 4, lines 1-3. The transmitting device therefore is not a hydraulic motor or pump. The use of such a hydraulic motor or pump is neither disclosed nor suggested in *Eakman*.

For at least the above reasons, the subject matter of claim 28 is neither taught nor suggested by *Pierce* or *Eakman*, taken either alone or in combination. Accordingly, claim 28 is patentable over *Pierce* and *Eakman*.

V. Prior Art Rejections Based on Girone

A person skilled in the art, seeking to find a system for the storage and conversion of heat energy, starting from *Pierce*, would have no reason to turn to *Girone*.

Girone concerns an apparatus for heating or maintaining the temperatures of fluids. Girone's invention concerns an apparatus employing solar energy to heat the fluid material. *See* col.1, lines 10 and 25-26. Even if Pierce were combined with Girone, Girone would not provide any further relevant teachings on energy conversion, but only on maintenance of a preselected temperature of the heated material. The main focus in Girone is the provision of a system for circulating hot, stored material from collectors to a storage facility and back. Accordingly, nothing taught or suggested in Girone may be combined with the teachings of Pierce and/or Eakman to render claims 9, 12, or 28 obvious.

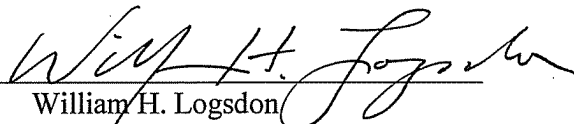
CONCLUSION

For the foregoing reasons, Applicant respectfully submits that independent claims 9, 12, and 28 are patentable over the prior art of record. Claims 10, 13, 19-21, 23-27, and 29-31, which depend from independent claims 9, 12, and 28, are likewise patentable for at least the same reasons. Accordingly, Applicant respectfully requests that the Examiner withdraw the rejections and allow the pending claims.

Respectfully submitted,

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